Space Weather Forecast

Issued on Saturday, 25 March 2023 at 00:34 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate Geomagnetic Storms likely with a slight chance of Strong storms on Day 1 (25 Mar). Chance of R1/R2 Radio Blackouts.

Solar Activity: Solar activity has been low over the past 24 hours with occasional minor Common-class flares. There are currently eight sunspot regions on the visible disc. A region which has just reached the southwest quadrant remains the largest and most complex region on the disc, with some growth in the area of the trailing spots. A region near north centre disc shows more of a north-south magnetic alignment, which may increase magnetic instability. Two further regions have shown some minor growth in recent hours. The other regions appear to be mostly stable at present with limited size and magnetic complexity.

No Earth directed Coronal Mass Ejections (CMEs) are currently forecast.

Solar Wind / Geomagnetic Activity: The solar wind has shown waning CME effects, with a possible onset of a coronal hole fast wind. Wind speeds have been slightly elevated, varying between 400-500 km/s. The Interplanetary Magnetic Field was initially strong, but became mostly moderate from 24/0600 UTC. The north-south component started strongly negative, but gradually became mostly weakly negative after 24/0730 UTC. Geomagnetic activity was initially G3/Strong (Kp7), with a G4/Severe storm (Kp8) interval observed 24/0300-0600 UTC. Since then activity has gradually declined to be mostly Unsettled to G1/Minor storm (Kp3-5).Enhanced aurora was observed across Scotland, Northern Ireland and northern England with reports of visible aurora across parts of central and southern England.

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10MeV) as measured at GOES16 is at background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is most likely to remain low, but with a chance of becoming moderate with any isolated Moderate-class flares. The main region likely to give higher flares is the larger region in the southwest.

Solar Wind / Geomagnetic Activity: The arrival of two CMEs that left the Sun on 20 Mar are the most likely cause of the enhanced geomagnetic activity that commenced on 23 Mar. Effects from these CMEs are now waning, with no further Earth directed CMEs currently forecast. A coronal hole fast wind is likely to have started to arrive at Earth, although the ongoing CME effects are swamping this signal to some extent. Wind speeds are likely to be at elevated levels around 500-550km/s with this feature, albeit with some uncertainty. Currently, it is considered most likely that elevated wind speeds will continue through the next couple of days with a slow decline thereafter.

Geomagnetic activity is forecast to remain enhanced at first with G1-G2/Minor-Moderate storms likely, with just a slight chance of further G3/Strong storms on Day 1 (25 Mar). As the CME and then fast wind effects wane geomagnetic activity is expected to slowly ease, likely becoming mostly Quiet by Day 4 (28 Mar).

Aurora may be visible on Day 1 (25 Mar) in parts of Scotland, Northern Ireland and northern England. There is just a slight chance of this reaching further south towards Wales and central England should any further G3/Strong intervals occur.

Energetic Particles / Solar Radiation: High energy (greater than 10MeV) proton flux is expected to continue at background levels, but with a slight chance of reaching S1 or greater, should any significant flares occur.

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Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	60	30	10	1
Strong	G3	Yes	10	1	1	1
Severe	G4	Yes	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	25	25	25	25
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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